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doi:10.1016/j.ijid.2010.02.1682

28.013

In vitro inactivation of avian influenza virus by Capryilic acids and its derivatives

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Background: Avian influenza is an important disease as it causes significant economic losses to the poultry industry. Further, transmission of the virus to humans enhanced the major public health significance. Since the virus is highly contagious, strict hygienic measures employed at the poultry farms can greatly help prevent the virus from spreading. Contaminated food, water, and poultry manure are most important vehicles of the virus to infect animals and humans. Effective and safe antimicrobials that kill the virus in the aforementioned vehicles could greatly reduce spread of the virus. Caprylic acid is a natural fatty acid and its other chemical forms, namely sodium caprylate and monocaprylin are highly effective in killing a variety of disease causing bacteria and viruses.

Methods: Low pathogenic avian influenza viruses H5N1 and H5N2 were subjected to caprylic acid, sodium caprylate and monocaprylin. Concentrations of viruses were determined using TCID50 in the cell culture. Plaque assays were optimized and 100 PFU viruses were used to infect chicken embryo kidney cells. Serial dilutions of fatty acid compounds were made from 0.005% to 0.5% for each virus to observe their virucidal effects in plaque assays. The effect of the caprylic acid to virus particles was observed using the transmission electron microscope.

Results: Caprylic acid and its derivatives were able to inhibit the plaque forming in chicken embryo kidney cells. The minimum inhibitory concentrations were 0.5% for caprylic acid, 0.1% for sodium caprylate and 0.05% for monocaprylin. Using transmission electron microscope, negative staining of avian influenza virus particles treated with 0.5% caprylic acid indicated disruption of cell membrane and envelope of the viral particle.

Conclusion: Low concentration of caprylic acid and its derivatives in-vitro can reduce or inhibit avian influenza virus. Therefore, caprylic acid and its derivates are potential to be effective and safe antimicrobials that can be used in poultry feed in order to reduce transmission to humans.

doi:10.1016/j.ijid.2010.02.1683

Development of new effective antiinfluenza drugs based on extracts of basidiomycetes

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Background: Due to the high incidence of respiratory diseases in humans caused by influenza viruses of different subtypes are now particularly relevant search for new curative and preventive drugs against influenza. Many species and strains of basidiomycetes are producers of natural compounds exhibiting anti-tumor and antiblastic activity, cytostatic effect and antiviral effect. Specific components of different bio-genetic origin, with antibacterial, antifungal, nematodocidal, cytotoxic, antiviral, and other pharmacological properties of the basidiomycetes were identified in different investigations. Study of antiviral activity of extracts isolated from basidiomycetes against influenza virus, including highly pathogenic avian influenza and creation on their basis of new non-toxic antiviral drugs is essential for health. In the present investigation was carried out screening and studying of antiviral activity of basidiomycete extracts in experiments on MDCK cells for avian influenza A/H5N1 virus.

Methods: In present study more than 70 water extracts of fungi of the genera Rleurotus, Ganoderma, Laetiporus, Inonotus, Lentipus obtained from the laboratory collection of fungal cultures and the simplest of SRC VB ''Vector'' were used. The antiviral effect of extracts of fungi was assessed by highly pathogenic avian influenza A/chicken/Kurgan/05/2005 (H5N1) virus strain and MDCK cells.

Results: The results showed that many of the studied extracts of basidiomycetes have not toxicity to MDCK cells and thus exhibit a high antiviral efficacy. This fact was noted in the evaluation of A/chicken/Kurgan/05/2005 infectivity in model of MDCK cells, when cultured with influenza virus strain in the presence and absence of tested drugs. Some aqueous extracts of fungi Ganoderma, Laetiporus, Inonotus and Lentipus has been shown in vitro to have high up to 1000- 10000 times neutralization activity for influenza A/chicken/Kurgan/05/2005 virus strain.

Conclusion: One possible reason for the effectiveness of the audited extracts isolated from the basidiomycetes is the presence of polysaccharides. The spectrum of polysaccharides, flavonoids, melanins, mycelium and fruit of body and other biologically active substances of basidiomycetes is very wide. The results of the studies of fungi extracts suggest about the great prospects associated with the study of substances from basidiomycetes to create new highly effective antiviral therapeutic preparations on their basis.

doi:10.1016/j.ijid.2010.02.1684